

REMARKS

Applicant thanks the Examiner for acknowledgment of a claim for foreign priority under 35 U.S.C. §119 and indication that certified copy of the priority document has been received by the Office.

The Examiner is respectfully requested to indicate the status of the drawings filed on September 10, 2003, since it is not clearly shown in the present Office Action.

The indication that claims 7, 11 and 17 are drawn to the allowable subject matter is noted with appreciation.

The specification has been updated to show the number of the patent issued on application Serial No. 10/363,822, referred to in the specification at pages 3 and 4. Additionally, by the current amendment the specification has been amended to correct a number of small grammatical errors.

Responding to the Examiner's objection of claim 19, as being improperly dependent from claim 10, claim 19 has been amended to be dependent on new claim 22. It is respectfully submitted that as amended claim 19 provides further limitation of the subject matter presented in claim 22. Withdrawal of the objection is therefore respectfully requested.

Claims 1 to 22 are currently active in the application. By the present amendment claims 9, 10, 11, 13 and 19 have been amended and claims 20 to 22 have been added for the Examiner's consideration to more clearly present the distinguishable features of the present invention. Specifically, the essential feature of the present invention of creating a powerful spiraling current has been emphasized in the amended independent claims 9 and 10 and new claims 20 and 22. Additionally, an improper dependency of claim 10 has been eliminated by amending claim 10 to be in independent form. No new matter is introduced by this amendment. The Examiner is respectfully requested to reconsider the application in a view of the above amendments and further remarks.

Claims 1-6, 8-10, 12-16 and 18 have been rejected under 35 U.S.C.

§103(a) as being unpatentable over Anderson et al. (U.S. Patent No. 5,574,485) in view of Rezanka et al. (U.S. Patent No. 4,734,705). This rejection is respectfully traversed for the reason that the combination of Anderson et al. and Rezanka et al. fails to show, suggest or otherwise teach the claimed invention.

The present invention is directed to a cleaning device for an inkjet recording head. The main specific feature of the present invention resides in creating a powerful spiral-shaped suction flow in the vicinity of an orifice nozzle. This spiraling current flow agitates debris like paper dust and foreign matter and deteriorated ink in the nozzle orifices to efficiently clean the inkjet recording head. In order to create this powerful spiral-shaped suction flow, the suction hole is positioned in such a way that the suction hole does not contact the nozzle orifice but forms an asymmetrical gap about the nozzle orifice. According to the claimed invention, this asymmetrical gap can be provided in two ways: if an orifice has an uneven surface (shown by Figures 5 and 6) or if a suction tube has a tip end cut in a slant (see Figure 8). In order to provide an unevenness of the orifice surface, the present invention uses the electrode/ink reception member 11, which forms a step on the orifice surface, providing an asymmetrical gap of the suction hole during cleaning. The case when the suction tube has a tip end cut in a slant is shown in Figure 8 and as it can be seen provides an asymmetrical gap at the orifice surface. It is clear that the spiraling current generates not only a purge power in a direction vertical to the orifice surface but also a wipe power in a direction parallel to the orifice surface. The wipe power enables the orifice surface to be cleaned more effectively.

In combining Anderson et al. and Rezanka et al., the Examiner makes the following statement:

“Whether the air flow is spiraling, turbulent or homogeneous carries less patentable weight. Because no matter what type of air flow is generated, debris or ink contaminants in the nozzles of the head are going to be drawn away by the air current/flow through the vacuum nozzles anyway.”

The Examiner is wrong in his analysis. It is this powerful spiral-shaped suction

flow in the vicinity of the orifice nozzle that produces the efficient cleaning of the inkjet recording head that is achieved by the claimed invention.

The Examiner states that because no matter what type of air flow is generated, debris or ink contaminants in the nozzles of the head are going to be drawn away by the air current/flow through the vacuum nozzles anyway. However, it is an object of the Claim 1 to clean not only a nozzle orifice but also a member around the nozzle orifice (an orifice surface and a different level member in Claim 1). In order to attain the above object, an air flow generating unit in Claim 1 generates a spiraling current. As mentioned, this spiraling current generates not only a purge power in a direction vertical to the orifice surface but also a wipe power in a direction parallel to the orifice surface, and it is the wipe power that enables the orifice surface to be cleaned more effectively.

The Examiner also states in the Office Action that the patent to Anderson shows all limitations of the claimed invention besides “a different level member having a surface at a different level than the orifice surface ...”, which is shown by reference to Rezanka et al. Applicant respectfully disagrees and submits that a combination of patents to Anderson et al. and Rezanka et al. cannot create the present invention for the simple reason that neither of these references shows generation of a spiraling current. More specifically, a vacuum nozzle 40 in Anderson et al. cannot generate a wipe power since a spiraling current is not generated. Accordingly, Anderson et al. cannot clean the orifice surface effectively as well as the device recited by Claim 1 in the present invention. Therefore, the prior art relied on by the Examiner is not relevant to the invention as presently claimed.

The patent to Anderson et al. discloses an ultrasonic liquid wiper station for ink jet printhead which cleans nozzles from viscous plugs of partially dried ink. A cleaning solution is held within the cleaning nozzle by surface tension to form a meniscus and is caused to bulge toward into contact with the printhead nozzle face and form a bridge of cleaning solution therewith. The cleaning solution not only dissolves ink but also, being ultrasonically excited by a

piezoelectric material, helps to remove viscous plugs from the nozzles. It should be noted that in the claimed invention in order to avoid viscosity of ink in the nozzles, Applicant provides an ejection of the refresh ink droplet 15. Therefore, ink can be reliably ejected from the nozzle and reliability of the recording head 1 is greatly enhanced. In order to avoid the refresh ink droplets messing up with recording droplets, the Applicant uses a charged electrode/ink reception member having an absorptive qualities. The Examiner properly noted in the Office Action that Anderson et al. does not show electrode/ink collection member.

The Examiner relies to the patent to Rezanka et al. as showing "a different level member". However, the existence or non-existence of ink collection member is not a matter of the present invention. As discussed above, the asymmetrical gap of the sucking tube to the nozzle in order to create more powerful spiral current flow is an essential feature of the claimed invention which is not shown by the primary reference to Anderson et al. Even more, since Anderson et al. show a sucking tube working in parallel with an orifice surface, the sucking flow is not strong enough, and a necessity for preliminarily resolving the problem of viscous substances in the nozzles is required. As it can be seen, this feature is not necessary in the claimed invention and allows simplifying the cleaning device while achieving a more efficient cleaning process. Therefore, Rezanka et al. does not show a structure analogous to the claimed electrode/ink reception member 11 since this reference also does not show generation of a spiraling current.

In order to emphasize the distinguishable feature of the present invention claims 9 and 10 have been amended. Further, new claims 20, 21 and 22 have been added and claims 11, 13 and 19 have been amended to depend from claim 22. As amended it is respectfully submitted that claims clearly define over the combination of Anderson et al. and Resanka et al. The prior art cited but not relied on by the Examiner has been reviewed, but for the reasons already advanced, that prior art is similarly not relevant to the invention as now claimed.

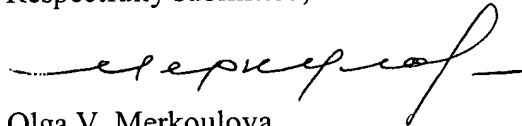
In view of the foregoing, it is respectfully requested that the application be reconsidered, that claims 1 to 22 be allowed, and that the application be passed to

issue.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

A provisional petition is hereby made for any extension of time necessary for the continued pendency during the life of this application. Please charge any fees for such provisional petition and any deficiencies in fees and credit any overpayment of fees to Attorney's Deposit Account No. 50-2041 (Whitham, Curtis & Christofferson, P.C.).

Respectfully submitted,



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